CHAPTER TWO
DEFINING RESEARCH PROBLEM AND HYPOTHESIS FORMULATION

Identification of a Research Topic and formulation of the Research problem

All research starts from a research problem. To do a research a research problem/ a topic must be identified. Formulating (selecting & properly defining) a research problem clearly is the first and most important step in the research process. It is said that "if the first step is not done correctly, the remaining steps will be a waste of time and labor." A research problem identifies your destination. It should tell you, your research supervisor and your reader what you intend to research. The identification/ finding of a research problem/ topic is a difficult activity but an important phase of the entire research process. It requires a great deal of time, energy and logical thinking on the part of the researcher.

2.1. What is a research problem?

All research is set in motion by the existence of a problem. A problem is a perceived difficulty, a feeling of discomfort about the way things are, or a discrepancy between what someone believes should be the situation and what the situation is in reality. Even though problems are the initiating force behind a research, not all problems require research. A potential research situation arises when three conditions exist:

- A perceived discrepancy exists between what is and what should be.
- A question exists about why there is a discrepancy.
- At least two possible and plausible answers exist to the question.

The last point is important. If there is only one possible and plausible answer to the question about the discrepancy, then a research situation does not exist. Research usually starts **with a felt difficulty or feeling of difficulty**. It takes place when there is a problematic situation and a need to solve the problem.

At the beginning, the researcher must single out (distinguish) the problem he wants to study. Activities thus, make up the first step in a scientific inquiry are such as:

- The problem may be stated in a broad general way and then ambiguities relating to the problem be solved.
- The feasibility of a particular solution has to be considered before a working formulation of the problem can be set up.
- Formulation of a general topic into a specific research problem

Hence, you should give considerable and careful thought at this stage. Essentially **two steps** are involved in formulating the research problem: ***Understanding*** the problem thoroughly, and ***rephrasing*** the same into meaningful terms from an analytical point of view.

It is extremely important to evaluate the research problem in the light of the

- Financial resources at your disposal,
- Time available, and
- Expertise and knowledge you and your supervisor have in the field of study
- Identify any gaps in your knowledge of relevant disciplines such as statistics, required for analysis.
- Ask yourself whether you have sufficient knowledge about computers and software if you plan to use them.

2.2. Components of a research problem

Generally a research problem exists if the following conditions are met with.

- There must be an individual or a group which has some difficulty or the problem
- There must be some objectives to be attained at. If one wants nothing, one cannot have a problem.
- There must be alternative means (course of action) for obtaining the objectives one wishes to attain. This means that there must be at least two means available to a researcher. If he has no choice of means, he cannot have a problem.
- There must remain some doubt (an unanswered question) in the mind of a researcher with regard to the selection of alternatives. This means that research must answer the question concerning the relative efficiency of the possible alternatives.
- There must be some environment to which the difficulty pertains.

A research problem may take a number of forms, from the **very simple** to the **very complex**. The way you formulate a problem determines almost every step that follows. i.e

- the **type of study design** that can be used;
- the **type of sampling strategy** that can be employed;
- the **research instrument** that can be used or developed;
- the **type of analysis** that can be undertake; and
- the **style of writing** of your report

Defining a research problem properly is a prerequisite for any study and is a step of higher importance. In the formal definition of the problem, the **researcher is required** to describe the background of the study, its theoretical basis and underlying assumptions, and state the problem in concrete, specific and workable questions.

2.3. Potential Sources of a Research Topic

Before determining the research topic the researcher has to choose a broad field of study within which he will conduct the study. A general understanding of the known facts and ideas in the field or area in which the researcher is interested constitute the first and most important step in selecting a problem for study. So, a general area of interest or aspect of a subject matter (agriculture, industry, social sector, etc.) may have to be identified at first and then the research topic is identified.

Most research revolves around **four P's**: People, problems, programs, and phenomena. The people provide you with the 'study population' whereas the other three P's furnish the 'subject areas'. Your study population – individuals, groups, and communities- is the people from whom the information is collected. Your subject area is a problem, program, or phenomenon about which the information is collected. Hence the different sources of a research Problem are:

Study Population: People, Individuals, organizations, groups, communities Subject area,
Problem: Issues, situations, associations, needs, population composition, profiles, etc.
Program: Contents, structure, outcomes, attributes satisfaction, consumers, service providers, etc.

Phenomenon: Cause and effect relationships, the study of the phenomenon itself, etc.

In addition other sources, which may be helpful to a researcher for selecting a research problem, also may be suggested as

A. Professional Experience

⇒ One's own professional experience is the most important source of a research problem.

⇒ Inferences from theory and Professional literature

⇒ Research problems can also emanate from inferences that can be drawn from theories and from empirical literature.

⇒ The validity, scope, and the particularity of various theories can be tested through research.

⇒ The study of professional literature will not only expose a researcher to pressing research problems but will suggest the way in which research is conducted.

⇒ Research reports, bibliographies of books, and articles, periodicals, research abstracts and research guides suggest areas that need research.

In general, a preliminary literature search is important in order to:

- ✓ Find out what other researchers have to say about the topic,
- ✓ Ensure that no one else has already exhausted the questions that you aim to examine,
- ✓ See how the topic has been discussed within the competing theoretical framework, and
- ✓ Make sure that there is enough material available for you to work with productively.

B. Technological and Social Changes

- o New developments bring forth new development challenges for research.
- o New innovations and changes need to be carefully evaluated through the research process.

Criteria for a good research topic

A good research topic should be feasible (can be done), interesting, novel, ethical and relevant (has an implication). The investigator can test how good the proposed research question is by using these five criteria:

- **Feasibility:** Before deciding on a research topic, the investigator must be sure that the research can be done and be completed.
- **Interest:** The research topic must be of interest to the investigators and to the scientific community. If the investigators are not excited about the topic, or cannot get colleagues interested in it, the project is probably not worth doing.
- **Novelty:** The research is expected to contribute new information. Novel does not necessarily mean that the research has not been done before. The prefix "re" in the word research implies searching again. Most good studies are neither original nor simple duplication of other studies. The progress of science is incremental, with knowledge gradually building up from different studies. The question should not be about whether the study has been done before, but whether it will add to the existing body of knowledge.
- **Ethics:** Ethical issues must be addressed at the early stage of selecting the research topic as well as in planning the research. Some ethical problems may indicate that the research should not be considered from the beginning. The research should not conflict

with the society's cultural, moral, religious and legal values.

- **Relevance:** This criterion can be called: the "so-what?" test. For the research to be considered relevant, it must have the potential to advance scientific knowledge, influence experimental management, influence policy, or guide further research.

Selection of a Research Problem

The task of formulating or defining the research problem is a step of greatest importance in the entire research process. Formulation of the research problem often follows **a sequential patter,** where:

- A number of formulations are set up
- Each formulation is more specific than the preceding one,
- Each phrases in more analytical terms.

2.4. Considerations in Selecting a Research Problem

When selecting a research problem there is a number of considerations to keep in mind. These help to ensure that your study will be **manageable** and you will **remain motivated**. These considerations are:

- ✓ **Interest**: A research endeavor is usually time-consuming, and involves hard work and possibly unforeseen problems. If you select a topic which does not greatly interest you, it could become extremely difficult to sustain the required motivation, and hence the completion time could be affected.
- ✓ **Magnitude:** Narrow down the topic to something manageable, specific and clear. It is extremely important to select a topic that you can manage within the time and resources at your disposal.
- ✓ **Measurement of concepts:** If you are using a concept in your study, make sure you are clear about its indicators and their measurement. Do not use concepts in your research problem that you are not sure how to measure. This does not mean you cannot develop a measurement procedure as the study progresses.
- ✓ **Level of expertise:** Make sure you have an adequate level of expertise for the task you are proposing. Allow for the fact that you will learn during the study and may receive help from your research supervisors and others, but remember you need to do most of the work yourself.
- ✓ **Relevance:** Select a topic that is relevant to you as a professional. Ensure that your study adds to the existing body of knowledge, bridges current gaps or is useful in policy formulation. This will help you to sustain interest in the study.
- ✓ **Availability of data:** If your topic entails collection of information, before finalizing your topic, make sure that these data are available and in the format you want.
- ✓ **Funding:** Choice of a research problem will also be affected by the funding of the research.
- ✓ **Ethical issues:** Another important consideration in formulating a research problem is the ethical issues involved.

2.5. Steps in the Formulation of a Research Problem

The process of formulating a research problem consists of a number of steps. Working through these steps presupposes a reasonable degree of knowledge in the broad area within

which the study is being carried out. Lack of such knowledge may stand in the way of clearly '**dissecting'** a problem. If you don't have a specific research topic, one approach is:

- First to **identify a broad field of interest** to you.
- Then, have a **brainstorming session** to dissect it into subfields or areas. Based upon the principle of 'narrowing the problem' the **following steps** can help in formulating a research problem.
- Identify a broad area of interest
- Dissect the broad area into sub-areas, hold a brainstorming session with yourself, peers, professionals and others to identify the subareas.
- Select a sub-area
- Areas in which you would like to conduct your research.
- Raise research questions that you would like to answer through your study.
- Formulate objectives (main and sub) for your study.
- Assess these objectives to ascertain the feasibility of attaining them in the light of the time, resources (financial and human) and technical expertise at your disposal
- Double check that you are sufficiently interested in the study and have adequate resources for undertaking it. As you narrow the research problem you need to be extremely specific in identifying the study population and source of your information in order to select the appropriate respondents.

2.6. Formulation of Research Hypotheses

Once the selection and definition of the problem have been accomplished, the derivation of working hypothesis is the most important step in the research process.

The word hypothesis is a compound of two words, 'hypo' and 'thesis'. Hypo means, under or below and thesis means a reasoned theory or national viewpoint.

The term hypothesis is defined as a proposition that is stated in a testable form and predicts a particular relationship between two or more variables.

RESEARCH PROBLEM: "*Factors that contribute to lower achievement of female students than males in ESLCE in A.A*"

The following hypotheses could be derived from the above research problem:

H1. Female Students receive significantly less support to their education than that of their male counterpart.

H2. Female Students sustain significantly higher stereotypes in textbooks than do their male counterpart.

It should be noted that these hypothesis are taken as a tentative solutions to the problem with the understanding that the investigation in due course may lead either to their retention or rejection.

Establishing a hypothesis should follow rules like:

- ✓ The variables must be clearly specified and measurable by some techniques we know
- ✓ The relationship between them must be stated precisely.

2.7.Importance of hypothesis

A well-grounded hypothesis provides the following advantages:

- Represents specific objective, which determine the nature of the data needed to test the proposition.

- Offer basis for selecting the sample, the research procedure, and the statistical analysis needed.
- It Prevents Blind Research: "The use of hypothesis prevents a blind search and indiscriminate gathering of masses of data which may later prove irrelevant to the problem under study."
- Keeps the study restricted in scope thereby preventing it from becoming too broad.
- Sets a framework for reporting the conclusion of the study.

Source of Hypothesis

The inspection for hypothesis comes from a number of sources w/h includes the following:

1. *Professional Experience*: The daily life experience or the day to day observation of the relationship (correlation) between different phenomena leads the researcher to hypothesize a relationship and to conduct a study if his/ her assumptions are confirmed.
2. *Past Research or Common beliefs*: Hypothesis can also be inspired by tracing past research or by commonly held beliefs.
3. *Through direct analysis of data or deduction from existing theory*: Hypothesis may also be generated through direct analysis of data in the field or may be deducted from a formal theory. Through attentive reading, the researcher may able to get acquaintance with relevant theories, principles and facts that may alert him or her to identify valid for his/her study
4. *Technological and social changes*: Directly or indirectly exerts an influence in the function of an organization. All such changes bring about new problems for research.

Forms of Hypothesis

Statement of research hypothesis can take a declarative (positive) form, negative form, the null form, or the question form.

Positive: Students who learn in small class size will perform significantly better in mathematics test than those who learn in large class size.

Negative: *Students who learn in small class size will not perform significantly better in math's test than those in large class size.*

Null Form: There is no significances difference between students who learn in small class size and those who learn in large class size in their mathematics performance.

Question Form: Is there significant difference between students who learn in small class size and those in large class size in their math's performance?

In general, when a researcher makes a positive statement about the outcome of the study, the hypothesis takes declarative forms. When the researcher negates about outcome of the study, the hypothesis takes the negative form.

When the researcher makes a statement that no relationship exists, the hypothesis takes the null form. In the question form hypothesis, a question is asked as to what the outcome will be instead of stating what outcome is expected. It should also be noted that a working proposition stated either in declarative, negative, null, question form is a matter of preference by the researcher.

2.8.Characteristics of a Useable Hypothesis

A fruitful hypothesis is distinguished by the following characteristics:

1. A hypothesis should be empirically testable- its concepts must have clear empirical correspondence and should be explicitly defined in a way it can be proved or disproved e.g Bad parents beget bad children. Bad cannot be explicitly defined.
2. The hypothesis should be conceptually clear- the concepts should be clearly defined, operationally if possible, and the definitions should be commonly accepted and communicable rather than the production of the researcher himself. An ambiguous hypothesis characterized by undefined or ill deigned concepts cannot be tested.
3. The hypothesis should be closest to things observable- It should provide conditions for comparison with empirical facts.
4. The hypothesis must be specific- It should be concrete and objective and predictable rather than subjective.
5. The hypothesis should be related to a body of a theory or some theoretical orientation. The theoretical gains of testing the hypothesis should be justified so that the research outcome will help to qualify, support, correct or refute a theory. Moreover the function of research may be elaborating, extending and improving a theory.
6. The hypothesis should be related to the available techniques its research ability may be determined by available analytical techniques and the hypothesis should be formulated after duly considering the methods and techniques of researches.

2.9. Criteria for Hypothesis Formulation

There exist two criteria for formulation of a good hypothesis. First, *it is a statement about the relations between variables*. Secondly *it carries clear implications for testing the stated relations*. Thus, these couple of criteria implies that the hypotheses comprise two or more variables which are measurable or potentially measurable and that they specify the way in which they are related. A statement which fails to meet these criteria is no scientific hypothesis in the true sense of the term. However, there are legitimate hypotheses, formulated in factor analytic studies.

The following examples may be cited in order to justify how the couple of criteria apply to hypotheses:

More intelligent persons will be less hostile than those of lower level of intelligence.

In this hypothesis, we visualize a relation stated between one variable, 'intelligence', and another variable 'hostility.' Furthermore, measurement of these variables is also easily conceivable.

Group study contributes to higher grade achievement.

In this example, a relation has also been stated between the variables 'group study' and 'grade achievement.' There exists the possibility of the measurement of the variables are thus there is implication for testing the hypotheses. Thus both the criteria are satisfied. '